THE CLAIMS

What is claimed is:

1. An optical gas sensor system for monitoring a gas species of interest in a gaseous sample comprising

a) a gas-retaining unit comprising an internal cavity for retaining a gas sample; and

b) an optical storage disk arranged for contact with the gas sample in the gas-retaining unit, wherein the optical data storage disk comprises a layer of a gas-sensing medium that exhibits a physical and/or chemical property change when exposed to the gas species of interest thereby generating optically readable signals; and

c) a laser energy source positioned to irradiate the optical data storage disk to detect changes in chemical and/or physical properties in the gas-sensing medium layer.

2. The system according to claim 1, wherein the gas-sensing medium is a phase-change material, an oxidation–reduction reaction material, a heat reactive material or a polymer that binds the gas species in a chemical change..

3. The system according to claim 1, wherein the gas-sensing medium is a rare earth metal material that upon exposure to a gas species of interest exhibits a change in optical properties.

4. A gas sensor system for monitoring a gas species of interest in a gaseous sample comprising:

a) a gas-retaining unit comprising an internal cavity for retaining a gaseous sample during a sampling period;

b) a layer of gas-sensing medium supported on an optically transparent support, wherein the gas-sensing medium is arranged for exposure to the gaseous sample and wherein the gas-sensing medium exhibits a chemical and/or physical property change when exposed to the gas species of interest; and

c) a laser energy source positioned to irradiate the gas-sensing medium to detect a chemical and/or physical property change and record detected changes to a recordable optical storage disk.

5. The system according to claim 4, wherein the recording medium is susceptible to the formation of optically readable signals after contact with the gas species, thereby detecting the gas species.

6. The system according to claim 4, wherein the optical data storage disk comprises a spiral track for recording in the gas-sensing medium.

7. The system according to claim 4, wherein the gas-sensing medium is deposited on the surface of the optically transparent support.

8. The system according to claim 4, wherein the property change comprises, a phase-change, mass change, or optical property change.

9. The system according to claim 4, wherein the gas-sensing medium generates an optically readable signal after interaction with the gas species of interest.

10. The system according to claim 4, wherein the gas-sensing medium is a rare earth metal material overcoated with Pd for detection of hydrogen gas.

11. The system according to claim 6, wherein only a section of the gas-sensing medium is exposed to the gaseous sample during a sampling period and is recorded in the gas-sensing medium.

12. The system according to claim 11, wherein the optical data storage disk is rotated after a sampling period thereby exposing a new section of the gas-sensing medium for a new sampling period.

13. The system according to claim 10, wherein the gas-sensing medium comprises a thermal recording material that when contacted by the gas species of interest exhibits a phase-change or optical change.

14. An optical gas sensor for monitoring a gas species of interest in a gaseous sample comprising:

an optical storage disk arranged to contact the gaseous sample, wherein the optical data storage disk comprises a gas-sensing medium that exhibits a property change when exposed to the gas species of interest, thereby creating an optically readable signal.

15. The optical gas sensor according to claim 14, further comprising a transparent support structure for depositing the gas-sensing medium thereon.

16. The optical gas sensor according to claim 14, wherein the property change comprises a phase-change, chemical change, or optical property change.

17. The optical gas sensor according to claim 15, wherein the optical data storage disk comprises a spiral track for depositing the gas-sensing medium.

18. The optical gas sensor according to claim 14, wherein only a section of the gas-sensing medium is exposed to the gaseous sample during a sampling period.

19. The optical gas sensor according to claim 14, wherein the optical data storage disk is rotated after a sampling period thereby exposing a new section of the gas-sensing medium for a new sampling period.

20. The optical gas sensor according to claim 19, wherein the rate of rotation is controlled to provide for long periods of detection.

21. The optical gas sensor according to claim 14, wherein the property change is physical and/or chemical.

22. A gas sensor system for monitoring a gas species of interest in a gaseous sample comprising:

a) a gas-retaining unit comprising an internal cavity for retaining a gaseous sample comprising a gas species of interest during a sampling period;

b) at least a section of a gas-sensing medium arranged for contact with the gaseous sample in the internal cavity, wherein the gas-sensing medium is susceptible to a physical and/or chemical property change after contact with the gas species of interest in the gaseous sample, thereby forming optically readable signals or changes;

c) a laser-energy source communicatively connected to the internal cavity and positioned to optically irradiate the gas sensing medium to detect any optically readable signals; and

d) a writable CD-ROM disk arranged to receive an altered laser energy beam after transmission through or reflection from the gas-sensing medium for storage of detected optically readable signals.

23. The system according to claim 22, wherein the altered laser energy beam is transmitted through the gas-sensing medium.

24. The system according to claim 22, wherein the altered laser energy beam is reflected from the gas-sensing medium

25. The system according to claim 22, further comprising a detection laser energy source positioned to illuminate through the rear of the CD-ROM and sensing layer.

26. The system according to claim 22, wherein the writable CD-ROM disk comprises a transparent supporting substrate, a layer of photosensitive dye and a reflective metal layer applied on the photosensitive dye

27. The system according to claim 22, wherein the gas-sensing medium is a polymer film.

28. The system according to claim 22, wherein only a specific section of the gas-sensing medium is exposed to the gaseous sample comprising the gas species of interest during a sampling period.

29. The system according to claim 22, wherein the gas-sensing medium is rotated after a sampling period thereby exposing a new section of the gas-sensing medium for a new sampling period.

30. The system according to claim 26, wherein the property change comprises, a phase-change, chemical change, or optical property change.

31. A method of detecting a gas species of interest in a gaseous sample, the method comprising:

a) providing a sensor comprising a gas-sensing medium that exhibits a physical and/or chemical property change when exposed to the gas species of interest;

b) exposing the gas-sensing medium to the gaseous sample; and

c) monitoring chemical or physical property change in the gas-sensing medium to determine presence of the gas species of interest.

32. The method according to claim 31, wherein monitoring the chemical or physical property change comprises:

a) irradiating the gas-sensing medium with a laser energy beam to detect optically readable signals formed in the gas-sensing medium after contact with the gas species of interest; and

b) transmitting the optically readable signals to a writable CD-ROM for recording and storage thereon.

33. The method according to claim 32, wherein the laser energy beam is altered after detecting optically readable signals.

34. The method according to claim 33, wherein the altered laser energy beam is reflected off the gas-sensing medium or transmitted through the gas-sensing medium.

35. The method according to claim 33, wherein the writable CD-ROM disk comprises a transparent supporting substrate, a layer of photosensitive dye and a reflective metal layer applied on the photosensitive dye.

36. The method according to claim 33, wherein the writable CD-ROM disk comprises a transparent supporting substrate and a polymeric thin film sensing layer.

37. The method according to claim 33, wherein only a section of the gas-sensing medium is exposed to the gaseous sample during a sampling period.

38. The method according to claim 32, wherein the property change comprises, a phase-change, chemical change, or optical property change.